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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
08/834,798	04/03/97	PEDERSEN	D 20879-0009

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EXAMINER

VIGUSHIN, J

ART UNIT	PAPER NUMBER
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2835

18

DATE MAILED: 03/14/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

08/834,798

Applicant(s)

Pedersen et al.

Examiner

John Vigushin

Group Art Unit

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☒ Responsive to communication(s) filed on May 3, 1999 - CPA

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-18 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☒ Claim(s) 15 is/are allowed.

☒ Claim(s) 1-4, 8-10, 14, and 16-18 is/are rejected.

☒ Claim(s) 5-7 and 11-13 is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Continued Prosecution Application

1. The request filed on May 03, 1999 for a Continued Prosecution Application (CPA) under 37 CFR 1.53(d) based on parent Application No. 08/834,798 is acceptable and a CPA has been established. An action on the CPA follows.

REJECTIONS BASED ON PRIOR ART

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

3. Claims 1-4, 8-10, 14 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Pat. No. 5,329,423 awarded to Scholz.

The applicant's recited "substrate" is represented by element **52**. The applicant's recited "plurality of terminals" are represented by elements **54** and **56**. The applicant's recited "semiconductor chip" is represented by element **46**. The applicant's recited "bonding pads" are represented by elements **48** and **50**. The applicant's recited "first insulation layer" is represented

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by element 72. The applicant's recited "**metal layer**" is represented by element 66 or 68. The applicant's recited "**second insulation layer**" is represented by element 70. The applicant's recited "**electrically conductive epoxy**" is represented by element 58 or 60. The applicant's recited "**means for maintaining a minimum bond thickness**" is represented by element 78.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-4, 8-10, 14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No 5,656,863 awarded to Yasunaga et al. in view of any one of U.S. Pat. Nos. 4,578,215 and 4,818,823 both awarded to Bradley or U. S. Pat. No. 4,999,136 awarded to Su et al.

Claims 1-4, 8-10, 14 and 16 define over the structure of Yasunaga et al.

(5,656,863) by the requirement that there is an **electrically conductive epoxy applied between the external connection points of the semiconductor chip and the terminals of the substrate** instead of the solder taught by Yasunaga et al. (5,656,863).

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U.S. Pat. Nos. 4,578,215 and 4,818,823 both awarded to Bradley and U. S. Pat. No. 4,999,136 awarded to Su et al all establish that, before the invention by the applicant, those in the art recognized the functional interchange ability between solder and electrically conductive epoxy.

Thus, it would have been obvious to one possessing an ordinary level of skill at the time of the invention by the applicant to modify the invention of Yasunaga et al. (5,656,863) by replacing the solder of Yasunaga et al. (5,656,863) with an electrically conductive epoxy, as taught by any one of the U.S. patents awarded to Bradley or the US Patent awarded to Su et al., since Su et al. (4,999,136) establishes in column 1, lines 58-63 that **solder and electrically conductive adhesive are known functional equivalents and are interchangeably used for the same purpose. *Smith v. Hayashi* , 209 USPQ 754 (Bd. of Pat. Inter. 1980)** Furthermore, Su et al. (4,999,136) in column 1, lines 58-63, and Bradley (4,818,823) in column 1, lines 25-64, teach that the **use of electrically conductive epoxy instead of solder is particularly more attractive because electrically conductive epoxy is a much simpler and less expensive mounting procedure.** Bradley (4,818,823) goes on in column 1, lines 34-54 to teach that the use of **solder requires the use of high temperatures and the cost involved with an attempt to minimize the shock effects of the high temperatures used in soldering procedures is high.**

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6. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,329,423 awarded to Scholz in view of any one of U.S. Pat. No. 4,545,610 awarded to Lakritz et al., Japanese ref. (2-133936) or Japanese ref. (1-35528).

Claim 17 defines over the structure of Scholz (5,329,423) by the requirement that the is an **means for maintaining a minimum bond thickness includes at least one sphere.**

Lakritz et al. (4,545,610), Japanese ref. (2-133936) and Japanese ref. (1-35528) all establish that, before the invention by the applicant, is was known to **use spheres for the purpose of maintaining a desired thickness or spacing between external connections of a semiconductor chip and the terminals on a substrate.**

Thus, it would have been obvious to one possessing an ordinary level of skill at the time of the invention by the applicant to modify the invention of Scholz (5,329,423) by **using spheres to maintain a desired thickness between external connections of a semiconductor chip and the terminals on a substrate,** as taught by any one of Lakritz et al. (4,545,610), Japanese ref. (2-133936) and Japanese ref. (1-35528), since Lakritz et al. (4,545,610) teaches in column 4, lines 23-28 that such a modification would **maintain the desired spacing between the semiconductor chip and the substrate** and Japanese ref. (1-35528) teaches that such a modification would **prevent an uneven displacement or tilting of the mounted chip to the substrate.**

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7. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,329,423 awarded to Scholz in view of anyone of U.S. Pat. No. 4,545,610 awarded to Lakritz et al., Japanese ref. (2-133936) or Japanese ref. (1-35528) as applied to claim 17 above, and further in view of U.S. Pat. No. 4,545,840 awarded to Newman et al.

Claim 18 further limits the invention defined in claim 17 by the requirement that the **at least one sphere is a glass sphere.**

Newman et al. (4,545,840) teaches that, well before the invention by the applicant, it was known to use **glass spheres in an electrically conductive epoxy.**

Thus, it would have been obvious to one possessing an ordinary level of skill at the time of the invention by the applicant to further modify the invention of Scholz (5,329,423) by **using glass spheres in the electrically conductive epoxy to maintain a desired thickness between external connections of a semiconductor chip and the terminals on a substrate,** as taught by Newman et al. (4,545,840) in column 5, lines 23-28, since Newman et al. (4,545,840) teaches in column 5, lines 53-62 that because **glass spheres have a higher melting temperature than the electrically conductive epoxy, the spheres remain constant during the chip attachment step and therefore the gap between the semiconductor chip and the substrate also remain constant.**

8. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No 5,656,863 awarded to Yasunaga et al. in view of anyone of U.S. Pat. Nos. 4,578,215 and 4,818,823 both awarded to Bradley or U. S. Pat. No. 4,999,136 awarded

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to Su et al. as applied to claims 1-4, 8-10, 14 and 16 above, and further in view of Japanese ref. (1-35528) and U.S. Pat. No. 4,545,840 awarded to Newman et al.

Claim 17 defines over the already modified structure of Yasunaga et al. (5,656,863) by the requirement that the means for maintaining a minimum bond thickness includes at least one sphere and claim 18 requires that the at least one sphere is a glass sphere.

Japanese ref. (1-35528) establish that, before the invention by the applicant, is was known to at least one sphere for the purpose of maintaining a desired thickness or spacing between external connections of a semiconductor chip and the terminals on a substrate.

Newman et al. (4,545,840) teaches that, well before the invention by the applicant, it was known to use at least one glass sphere in an electrically conductive epoxy.

Thus, it would have been obvious to one possessing an ordinary level of skill at the time of the invention by the applicant to further modify the invention of Yasunaga et al. (5,656,863) by using glass spheres to maintain a desired thickness between external connections of a semiconductor chip and the terminals on a substrate, as taught by Japanese ref. (1-35528) and Newman et al. (4,545,840), since Japanese ref. (1-35528) teaches that such a modification would prevent an uneven displacement or tilting of the mounted chip to the substrate and Newman et al. (4,545,840) teaches in

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column 5, lines 53-62 that because glass spheres have a higher melting temperature than the electrically conductive epoxy, the spheres remain constant during the chip attachment step and therefore the gap between the semiconductor chip and the substrate also remain constant.

ACKNOWLEDGMENT OF ISSUES RAISED BY THE APPLICANT

Response to Amendment

Applicants' filed a request for a CPA on May 03, 1999, but failed to present any amendments or arguments concerning the examiner's rejection of the claims. Thus, the remarks made by the examiner in the Office action dated December 03, 1999 remain applicable and have been repeated in the instant office action.

ARGUMENTS CONCERNING FORMAL MATTERS

The applicant's traversal of the formal requirements requested by the examiner are addressed in the following section as required by M.P.E.P. § 707.07(f).

:IMPORTANT NOTE:

As this action constitutes a final rejection, applicant's response must either comply with all formal requirements or specifically traverse each requirement not complied with. The examiner further draws the applicant's attention to 37 C.F.R. § 1.113 and

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37 C.F.R. § 1.116 regarding the submission of after-final responses and amendments.

b. **ARGUMENTS CONCERNING PRIOR ART REJECTIONS**

1st Point of Argument:

Regarding the Applicant's amendment, dated April 29, 1998 (Paper No. 6), specifically challenging the Examiner and traversing the rejection of Claims 1-4, 8-10, 14 and 16-18 based on the Applicant's direct request that the Examiner provide evidence to support the Examiner's position that **solder and electrically conductive adhesive are known functional equivalents and are interchangeably used for the same purpose**. The Examiner directs the Applicant's attention to US Pat. Nos. 4,578,215 and 4,818,823, both awarded to Bradley and US Pat. No. 4,999,136 awarded to Su et al., all of which are relied upon by the Examiner in the above rejection. The Examiner notes that, as stated in **MPEP § 2144.03**, these new references requested by the Applicant are included in the rejection of the claims and the action still made **FINAL**.

2nd Point of Argument:

All arguments by the Applicant are believed to be covered in the body of the present Office Action or in the above remarks and thus, the present Office Action constitutes a complete response to the issues raised in the Applicant's remarks dated April 29, 1998.

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Allowable Subject Matter

9. Claim 15 has been allowed.
10. Claims 5-7 and 11-13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
11. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a) Khandros et al. (US 5,258,330) discloses the functional equivalence of solder and conductive adhesives as the bonding mass material 70 for establishing electrical connection between chip 20 and substrate 66 (Fig. 5; col.12: 1-11).

b) Otsuki et al. (US 5,846,853) disclose conductive particles 3 that establish the electrical connection between IC chip 4 and substrate 1 whereby the terminals 5 of IC chip 4 are spaced from the terminals 2 of substrate 1 by the conductive particles 3 (Fig. 7f; col.7: 66-col.8: 13).

13. All claims are drawn to the same invention claimed in the parent application prior to the filing of this Continued Prosecution Application under 37 CFR 1.53(d) and could have been

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finally rejected on the grounds and art of record in the next Office action. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing under 37 CFR 1.53(d). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

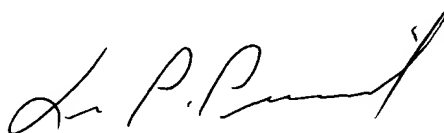
14. Due to changes in the Office, the present Examiner has replaced Primary Examiner Donald A. Sparks as the Examiner of record of the instant Application as of this Office Action.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Vigushin whose telephone number is (703) 308-1205. The examiner can normally be reached on Monday to Friday from 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo P. Picard, can be reached on (703) 308-0538. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

John B. Vigushin
Assistant Examiner
March 09, 2000



Leo P. Picard
Supervisory Patent Examiner
Technology Center 2800